niades tages, *H. malvae*, *Augiades sylvanus* just out, *Hipocrita jacobaeae*, *A. amata*, and *Anaitis plagiata*.

On June 25th, at Oxshott, Surrey. Weather again cold. *X. rurea* var. *alopecurus*, *Noctua brunnea*, *A. viridaria*, *X. montanata*, *Cabera exanthemata*, and *C. pusaria*.

In July conditions were better and we had some really hot days. During the first week, at Oxshott, I observed the following species :— *L. amata* common, *X. rurea*, *A. viridaria*, *L. impura*, *M. margaritaria*, *H. hectus* positively swarming, *E. jurtina* very common, *A. sylvanus* very common indeed, *Petilampa arcuosa*, *Cosmotriche potatoria*, *Hygrochroa syringaria*, *E. succenturiata*, and *Ania emarginata*.

On some waste ground close to Esher, Surrey, I found *Zygaena filipendulae* very common, including two ab. *conjuncta*.

On the 11th I tried Wisley Common. *Diacrisia sannio* was fairly frequent, *Perconia strigillaria*, *Anarta myrtilli* a most annoying insect when one is trying to capture it, as it is so swift when on the wing that it does not give one a chance, and when it settles it so resembles the heather that one cannot see it till it gets on the wing again, *Plebeius argus* (*aegon*) just emerging, and *Pachycnemia hippocastanaria*.

On the 12th I found *P. argus* (*aegon*) very abundant indeed on another part of the common, and saw all the species observed on the previous day.

July 13th, at Oxshott, *X. monoglypha*, *Petilampa arcuosa*, *A. emarginata*, *A. aversata*, *Hydriomena furcata* ab. *infuscata*.

On July 16th, *Aphantopus hyperantus* was fully emerged and very common, also *A. sylvanus* and *A. flava* (*thaumas*). I also took one specimen of *H. malvae* quite fresh, surely a very late date for this species. *Plusia gamma*, *Aglais urticae*, *Pseudoterpna pruinata*, *D. sannio*, and *P. chrysitis* were also seen.

On July 17th I again journeyed to Bramshott, but directly I got into the collecting ground the sun disappeared and the afternoon finished up with rain. Beside the usual common species I saw two specimens of *Limenitis sibilla*, also *A. urticae* and *Dryas paphia*.

On July 19th I again paid a visit to Oxshott, when, besides the species mentioned before, I found *P. argus* (*aegon*) common, a very dark specimen of *E. atomaria*, *L. impura* common, *Geometra papilionaria* very worn, *Hemithea striyata*, *T. fimbria*, one specimen at rest on a blade of grass, *P. arcuosa* abundant, *Z. filipendulae* and *Z. trifolii* common, *Caradrina taraxaci*, and *C. morpheus*.

(To be concluded.)

The Rainham "Hybrids."

By E. A. COCKAYNE, M.A., M.D., F.E.S.

A note entitled "Remarkable variety of *Lycaena bellargus*," published in the *Entomologist*, 1886, XIX., p. 176, by Mr. E. Sabine, states that he and his sons took five or six males of a beautiful pale lilac or French gray colour, and six females, very pale brown or fawn, clouded with pale lilac and with pale orange spots. They were all caught within the space of a couple of acres, and most of them in one particular portion of ground, a few yards in extent, where *bellargus* was very abundant. The date was June, and the place an inland locality in

Kent, where he had not collected previously. In a second note, on page 248, he says that, although the species was scarce in September, two more pairs were taken in two visits to the same place. He records that in June, 1887 (*Ent.* XX., pp. 181-2), more specimens of the same colour were taken on the same ground, but were distributed over a wider area, and suggests that they are a distinct species, simple varieties of *bellargus*, or hybrids between *bellargus* and *icarus*, most probably the latter.

Mr. Richard South describes eight of them in detail in the same volume, pp. 79-81. One of the males was a blue-black one, and one a mauve one with *bellargus*-blue margins. Of the seven pale specimens five had undersides like *bellargus* and two like *icarus*. In the Farn collection, sold in 1922, there were 24 males and 12 females catalogued as hybrids between *alexis* and *adonis*.

These were some of Sabine's specimens from Rainham. They varied a little in tint, but all were very pale with faintly chequered or plain white fringes.

I am indebted to Mr. L. W. Newman for the remains of one of them, a pale greyish-blue male. Its genitalia agree in all respects with those of *Polyommatus* (*Agriades*) *thetis* (*bellargus*), and show not ransition to those of *Polyommatus icarus*. In some parts of the wings the blue scales are curled up at the sides, in others they are rolled up into cylinders, but all appear pale blue by reflected light. Some androconia appear normal, but others are curled up. The lower layers of scales are deficiently pigmented, the lack of pigment being greater in some parts than in others. The peculiar colour is due to several factors. The abnormal structure of the blue scales produces a paler blue than usual, and the light is reflected from them at various angles owing to their deformity. The pinkish appearance is caused by the refraction of the light falling on the striated surface of the poorly pigmented lower layer of scales. It is most marked where the blue scales are most curled and leave them more completely exposed. The defect is very different from that found in the dark leaden *thetis*. In them the lower scales are fully pigmented, but the upper ones are very thin, quite colourless, and rolled into triangles with the tips so twisted as to resemble hairs. Their wings would appear black were it not for some light reflected from the upper scales.

There can be no doubt that the Rainham specimens are *Agriades thetis*, and that they owe their peculiar colour to a defect of pigment and structure of the lower and upper scales respectively.

Interesting as they are they afford no certain clue to the cause of this and similar abnormalities. Their occurrence in considerable numbers in three successive broods at least may be regarded as evidence of an inherited defect. But it can be explained with equal probability as the result of some disease due to special local conditions. Other facts are in favour of the correctness of the second of these alternatives. Sabine states that three of his earlier specimens were crippled, and some of Farn's specimens also were imperfectly expanded. Leaden *thetis* is not found at Folkestone every season, but in many different years it has appeared on the same small piece of down. Although in some specimens all the upper scales are affected uniformly, in others normal blue scales are present symmetrically placed along the costa or round the margin, and in a few specimens irregular patches of normal

scales are found, and the abnormal ones are not equally defective in different parts of the wings.

In the Rainham specimen I examined, the degree of defect varied in different parts, and one South described had normal blue scales round the margins. This patchy distribution is more suggestive of a disease than of an inherited condition. The occurrence of a leaden specimen amongst the grey-blue ones at Rainham is easier to explain, if both are the result of disease, in the one case affecting the upper scales severely and sparing the lower, and in the other affecting both layers to a moderate degree, than if each is due to an inborn error involving the development of the scales. They are so different that, if they are mutations, I think the grey-blue mutant must differ genetically from the leaden one. On the other hand, if they are due to disease it is remarkable that specimens like the Rainham ones have not been found at Folkestone and other places, where leaden ones occur. The arguments in favour of disease are not conclusive.

SCIENTIFIC NOTES AND OBSERVATIONS.

Brenthis euphrosyne, L. ab., **plumbea**, ab. nov.—This differs from the type in having on the underside all the spots, which are usually silver, a dull leaden colour. Microscopical examination of the scales shows no difference from the silver ones, except that of colour. It occurs in both sexes and is found in the Chilterns, where Mr. H. B. Williams caught two in 1916. I have seen three others from the Bucks Chilterns, one a bred specimen, and have heard of more. It is scarce, but appears to be firmly established in a rather restricted locality. No intermediate form appears to have been met with. The type is in the Collection of Mr. H. B. Williams.—E. A. Cockayne (M.D., F.E.S.), 116, Westbourne Terrace, W.2.

Lycaenid larvae and Ants.—It may be interesting to recall the observations made by Doherty in 1886 on this subject (*Jr. As. Soc. Bengal*). After quoting Dr. Thwaites in Moore's *Lepidoptera of Ceylon*, "Nature, however, finds a protection for these said helpless individuals [Lycaenid larvae] in the instincts of a species of ant, *Formica smaragdina*, which finding a substance palatable to it secreted naturally from a glandular defined spot upon the bodies of these helpless larvae, takes possession of them as 'cows,' surrounding each separate one, and the leaf on which it feeds, with a few silken strands of its web, protecting them jealously and attacking most fiercely any living thing intruding upon them:" Doherty gives his own observations on this singular occurrence as follows:—

"I have myself observed it in quite a number of Indian *Lycaenidae*, belonging to several distinct groups, and feeding on the leaves of various trees and herbs. The larvae in question are all very helpless and inactive grubs, slug-like in shape, tapering at both ends, pubescent, green or brown, with a very small retractile head. On each side of the penultimate segment above there is a short protuberance, from which can, in most cases (*e.g.*, *Tarucus theophrastus*), be extended a brush of hairs (apparently absent in some species, *e.g.*, *Azanus ubaldus*). This is, I have no doubt, a scent-gland, and may be intended to attract the notice of the purblind ants. On the dorsal line of the preceding